

Naval Advanced Amorphous & Thermal Spray Coatings Installed Successes



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Thermal Spray in the Navy



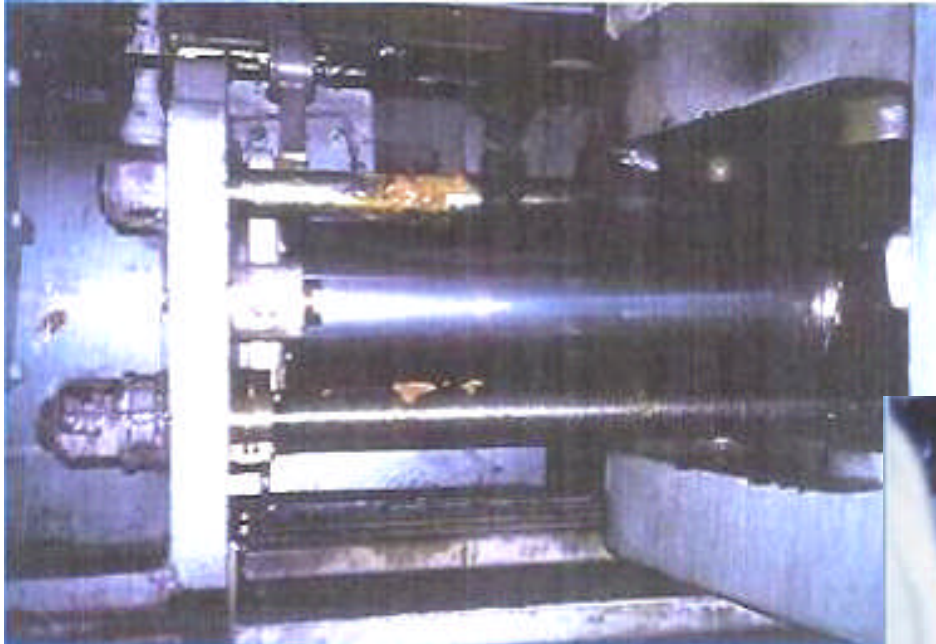
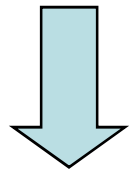
- **Mil-Std-1687A “Machinery element Repair & Restoration”**
- **Used since 1980 controlled by SEA 05P24**
- **Naval Shipyards Norfolk, Portsmouth & Pearl Harbor have small capability**
- **Naval Center of Excellence closed at Puget Sound Naval Shipyard**
- **Aircraft Coatings at NADEP’s: Jax, North Island & Cherry Point**
 - **Landing Gear**
 - **Hydraulic Cylinder Chrome Replacement**



USS Saipan LHA-2 Hydraulic Steering Rams



- Installed WC Hastelloy coating
- RAMS after 6 years at Sea
- No Gouging or Leaks
- Mirror Finish
- No Maintenance



- RAMS Before
- Hard Chrome Peeling
- Surface Gouging Present
- Prone to Hydraulic Leaks



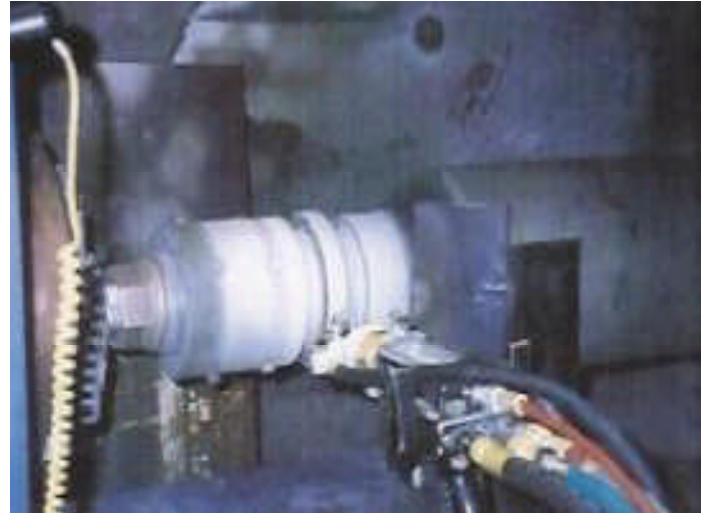
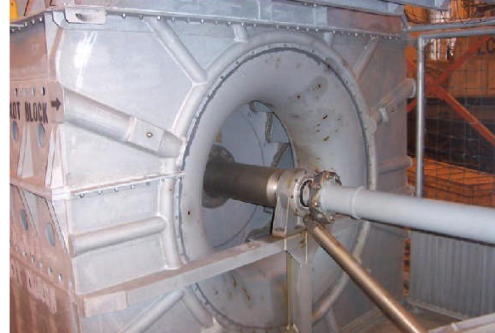
Nuclear Cooling Pump Casing



- Prone to Wear & Erosion Bearing Surfaces
- Installed HVOF Bronze Coating
- Corrected Problem
- Returned Pump to Service Quickly
- Fraction of Cost of New Pump
- New Pump is a Long Lead Time Item > 36 months



LCAC Lift Fan Repair



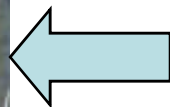
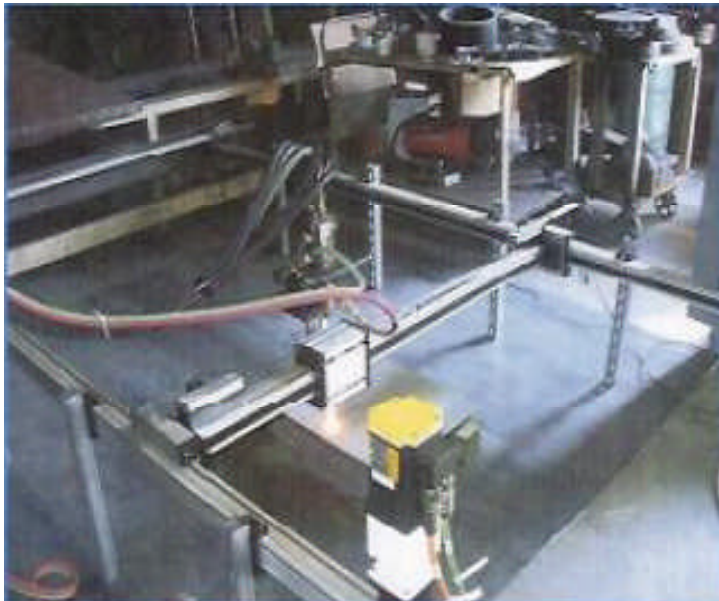
- Prone To Salt Water Pitting Corrosion in High Vibration Environment
- WC Hastelloy Coating
- No Corrosion after 5 years of Service
- Significant Reduction In Fleet Maintenance

Thermal Spray Processes



Oxy-Fuel

- Oxy-Fuel Wire
- Oxy-Fuel Powder
- HVOF



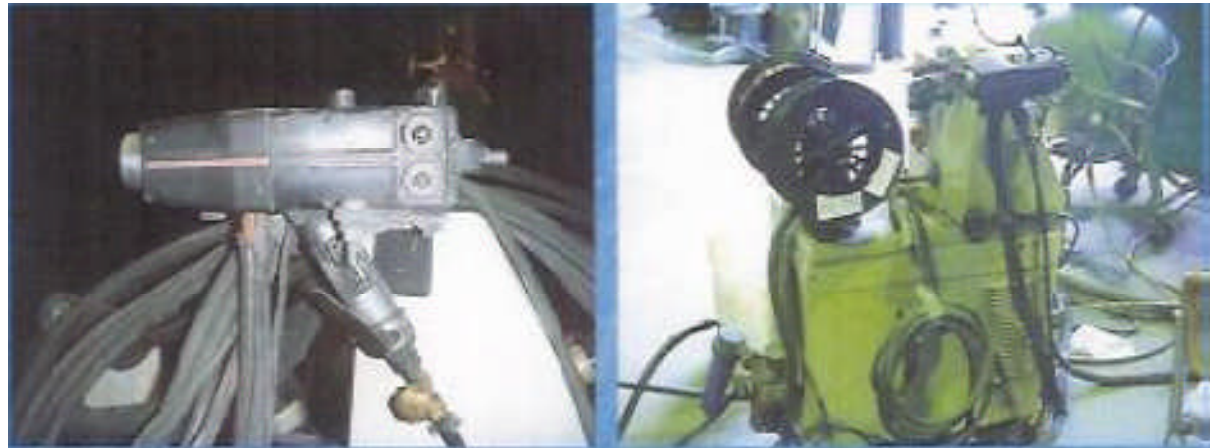
HVOF Portable Robotic System

Thermal Spray Processes (contd)



Electric

- Electric Arc Wire
- Plasma
- PTA Welding



Naval Advanced Amorphous Coatings Program



NAAC Non-Skid Program



- Provide Significant Improvement to Non Skid for all Ships
- 75% Carrier Flight Deck Non Skid Replacement due to Corrosion
- Tests Confirm Significant Improvements in Coefficient of Friction and Corrosion Resistance
- Installed on Several Test Ships including Carrier 4.5 Acre Flight Decks

Applications



- **Periscope Tube Reclamation**
- **Cylinder Refinish**
- **Valve Body Rebuild**
- **Valve Tappet Refinish**
- **Gate Valve Rebuild**
- **Ball Valve Refinish**

Trident Submarine Titanium Ball Valve Refurbishment



- Trident Sea Water Ball Valve Replaced Every 18 months Due to Corrosion
- Replacement Spare Source Industrial Base Not Available
- Refurbishment using Alumina Titania Ceramic Nano Coating Applied (Proprietary)
- Refurbished Balls installed 8 years ago
- No Maintenance No Corrosion
- All Submarine Valves Now Required to be Refurbished with Nano Ceramic Coating.

Alumina Titania Nano Ceramic Coating Rated SUB-SAFE for All Submarine Valves



4000 Cycle Test No Failures

Where Could the US Army Use These Rugged Coatings?



- **M-1A2 Abrams Tank Treads Pin Wear Out Replacement after 600 miles**
- **Rust Corrosion on Bogie Wheels and Tank Top & Sides**
- **Bradley Fighting Vehicle Treads Pin Wear Out Replacement after 800 miles**
- **Repairs Could be Done In Depots or Contractor Repair Centers**

2009 Medium Truck Program Procurement of Next Generation of 114,000 Tactical Vehicles



- **Use of Certified Robotically Controlled Thermal Spray Installation to**
 - **Eliminate Corrosion**
 - **Improve Reliability**
 - **Engine/ Transmission Component Improvement- Reducing Breakdowns**
- **Installation Should Be at Winning Contractor Plant Not an After Thought**
- **Required by Vehicle Specification by TACOM & MARCORSYSCOM**

United States Army Corps of Engineers Facilities

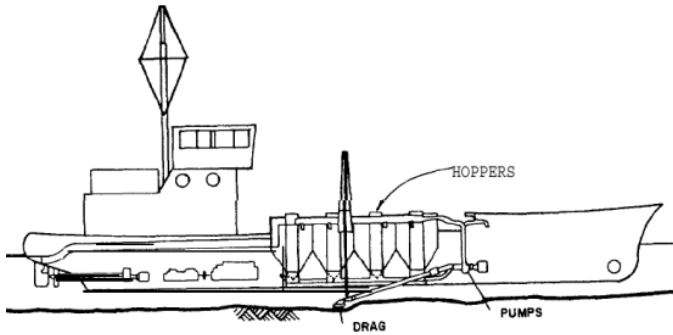


- **Benefits: Reduced Ownership Cost & Increased Reliability**
- **Canal Locks Valves & Lock Mechanism**
- **Pumps & Pump Housings**
- **Dredge Pump & Mechanical/Hydraulic Components Life Improvements**

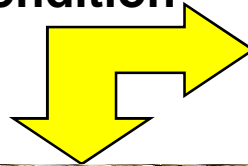




USACE Hopper Dredge Weir Hydraulic Piston Rod Chrome Plating Replacement



Before
Condition



Dredge 25 Foot Long Hydraulic Piston Rod Chrome Replacement



- Chrome Plating Heavily Pitted or Missing
- Required Smooth Piston Surface with 20 - 30 Ra Finish
- Chrome Replaced by Thermal Sprayed Austenitic Stainless Steel & Machined Tol. .002 In
- Expected Coating Life Greater than 15 Years





Conclusion

**“Improved Reliability & Lower Operating
Cost Is What Our Certified Thermal
Spray Products & Installation Can Do
For You”**

Thank You!

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